

Electronic key
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BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application claims the priority of German patent document 103 57 931.1, filed December 11, 2003 (PCT International Application No. PCT/EP2004/013799, filed December 4, 2004), the disclosure of which is expressly incorporated by reference herein.

[0002] The invention relates to an electronic key having a housing with a suspension eyelet that is situated near its periphery, and has use and non-use positions.

[0003] An electronic key of this generic type is disclosed in German patent document DE 198 20 831 C1 as a remote control unit for a motor car locking system. The remote control unit is accommodated in a plastic key housing which has a receiving shaft for a flat mechanical key that can be inserted into the receiving shaft and completely withdrawn from it, via an insert opening on the narrow side of the key housing. The inserted flat key is secured in the receiving shaft by means of a locking slide which completely covers the insert opening in its securing position, and can be moved into a position which releases the insert opening in order to withdraw the flat key.

[0004] The grip section of the flat key is provided with a suspension hole which, with the flat key inserted, is accessible via a cutout in the key housing for the purpose of suspending the key. Some regions of the cutout which are

arranged in the edge region of the key housing are bounded by the locking slide, so that the flat key can also be withdrawn from the receiving shaft in the release position of the locking slide when a keyring is attached to its suspension hole. After the flat key is withdrawn, the locking slide can move back to its locking position, with the locking slide and the wall regions of the key housing which bound the cutout forming a suspension eyelet which allows the key housing to be suspended even with the flat key withdrawn. The suspension eyelet can therefore be moved from a non-use position with the locking slide open, into its peripherally closed use position by locking the slide in the manner of a carabiner closure.

[0005] Since the suspension hole in the inserted flat key must be accessible via the opening in the suspension eyelet, however, the structural freedom of movement when designing the suspension eyelet is relatively limited.

[0006] One object of the invention, therefore, is to provide an improved electronic key of the type described above in which structural freedom of movement when designing the suspension eyelet is enhanced.

[0007] This and other objects and advantages are achieved by the electronic key configuration according to the invention, in which the suspension eyelet can have a cross section of virtually any desired shape. In particular, it can have a peripherally closed cross section, since the suspension eyelet is lowered into a receiving space in the key housing so that it is inaccessible in its

non-use position, and can be moved out into the use position by means of a guide arm for the purpose of suspending the key housing.

[0008] The suspension eyelet can be held on the key housing by means of the guide arm, such that it can pivot or slide as a function of the installation space available in the key housing. It can also have a receiving shaft for an associated mechanical key which can be inserted into the receiving shaft and completely withdrawn from it, with the suspension eyelet being provided for the purpose of suspending the key housing with the mechanical key withdrawn and being automatically moved to its use position when the mechanical key is withdrawn from the receiving shaft for the purpose of particularly simple operator control. In order to further simplify operator control of the electronic key, the mechanical key may force the suspension eyelet back into its non-use position when said mechanical key is inserted into the receiving shaft.

[0009] The suspension eyelet may be moved automatically to its use position in a particularly simple and reliable manner, by a spring which is arranged on the key housing. In order to secure the suspension eyelet against the spring force in simple and reliable manner, in its non-use position the suspension eyelet may be supported against a holding zone of the inserted mechanical key that is secured in the key housing by associated holding arrangements.

[0010] In its use position, the suspension eyelet may be supported against a bearing point of the key housing under the action of the spring, and therefore be fixed in a manner that is play-free, and without rattling.

[0011] In order to allow a particularly space-saving construction, the mechanical key according to the invention may be a flat, with the suspension eyelet having a plate-like region that runs largely parallel to a broad side of the inserted flat key, in a common receiving shaft of the key housing.

[0012] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Figure 1 is a perspective, oblique view of an electronic key having an associated flat key;

[0014] Figure 2 is a sectional view, through a key housing of the electronic key with the flat key inserted;

[0015] Figure 3 is a sectional view that corresponds to Figure 2, with the flat key withdrawn;

[0016] Figure 4 shows an alternative embodiment of a key housing for an electronic key with a suspension eyelet in its non-use position; and

[0017] Figure 5 shows the key housing from Figure 4 with the suspension eyelet in its use position.

DETAILED DESCRIPTION OF THE DRAWINGS

[0018] Figure 1 is a perspective view of an electronic key 10 with a key housing 11 that accommodates the electronic components (known per se) for radio remote control and for electronically identifying a motor car locking system.

[0019] The key housing 11 is composed of plastic material and comprises a grip section that includes an operator control area 12 with three operator control switches arranged on its upper broad side. A narrow shaft section 13 can be inserted into an associated opening in an electronic ignition lock.

[0020] The narrow end of the grip section of the key housing 11, opposite the shaft section 13, is provided with a slot-like insert opening 14 through which a flat mechanical key 20 passes. (The flat key is shown in Figure 1 in an intermediate position partially withdrawn from the receiving means of the key housing 11.)

[0021] The flat key 20 is usually produced from metal, and has an L-shape, with a shaft section 21 that is provided with a control path, and a grip leg 22 that protrudes laterally from the upper end of the shaft section 21. The grip leg 22 is provided with a circular fastening hole 23 for the purpose of suspending the flat key 20 (from a keyring, for example). The flat key 20 can be inserted into a receptacle of the key housing 11 and completely withdrawn from the latter via the insert opening 14. The receiving means comprises a narrow receiving shaft 15 for the shaft section 21 and an adjoining widened receiving opening 16 for the

grip leg 22. To enable the flat key 20 to be inserted when a keyring is fitted in the fastening hole 23, the key housing 11 has cutouts 17 at its two mutually opposite broad sides, which cutouts extend as far as the upper peripheral side of the key housing.

[0022] Figure 2 shows that, in its inserted position, the flat key 20 is almost completely lowered into the receptacle of the key housing 11, with the fastening hole 23 positioned in the region of overlap with the cutouts 17 of the key housing 11, so that it is accessible from two sides. A fastener (for example, a hook or a keyring), can therefore pass through the fastening hole 23 of the inserted flat key 20 for the purpose of suspending the electronic key 10.

[0023] The shaft section 21 of the inserted flat key 20 is completely lowered into the receiving shaft 15, and close to its lower end bears against an opposite first bearing point of the key housing 11, while a narrow end of the grip leg 22 is supported against an opposite second bearing point of the key housing 11. The latter bearing point is diagonally opposite the first bearing point as seen along the receiving shaft 15. The third bearing point for supporting the flat key 20 is formed by a spring-mounted blocking element (not shown) whose support end is supported in a recess 24 in the lower face of the grip leg 22.

[0024] The blocking element is mounted on the key housing 11 such that it can slide, with the advancing direction of the blocking element running approximately perpendicular to the insert direction of the flat key 22. In its securing position, the blocking element, which is made to slide in the direction of

the recess 24 in the flat key 20 by a spring (not shown), is supported in the recess 24. The inserted flat key 20 is held in the receiving shaft 15 of the key housing 11 by means of the blocking element largely without play.

[0025] In order to be able to remove the flat key 22 from the key housing 11, the blocking element can be pulled back into a release position against the spring force by means of an operating slide (not shown). In the release position its support end is moved out, such that it no longer coincides with the recess 24, and the flat key 20 on a keyring which is attached in the fastening hole 23 can be removed from the key housing 11 counter to the insert direction.

[0026] In order to allow the flat key 20, which is virtually entirely enclosed within the key housing 11, to be withdrawn without a keyring that penetrates the fastening hole 23, the flat key 20 may be pushed out into an intermediate position by a mold draft of the recess 24 which interacts with the blocking element. In the intermediate position the flat key 20 is pushed out of the receiving opening 14 by a length of several millimeters so that it can be gripped.

[0027] In order to allow the electronic key 10 to be suspended with the flat key 20 completely withdrawn, a suspension eyelet 30 is arranged on the key housing 11, and is held in the region of overlap with the cutouts 17 in its use position, and lowered into the receiving shaft 15 so that it is inaccessible in its non-use position. The plate-like suspension eyelet 30 is arranged close to the insert opening 14, in the receiving shaft 15 of the key housing 11, and runs with

its broad sides substantially parallel to, and at a very small distance from, the adjacent broad sides of the inserted flat key 20.

[0028] The suspension eyelet 30 is integrally formed from sheet metal, and comprises a circular, peripherally closed fastening ring 31 which is pivotably fastened to the key housing 11 by means of a radially protruding lever arm 32 and an associated pin 33. It can pivot, with the pivot axis running perpendicular to the longitudinal center plane of the plate-like suspension eyelet 30.

[0029] A torsion spring 34, which is composed of spring wire, is wound around the pin 33. The spring 34 bears against a support point of the key housing 11 with its first leg and is supported on the periphery of the fastening ring 31 with its second leg.

[0030] In the non-use (stowed) position of the suspension eyelet 30 (shown by a dashed line in Figure 2), its lever arm 32 projects into the receiving shaft 15 of the key housing 11 obliquely to the insert direction of the flat key 20. The fastening ring 31 is lowered into the receiving shaft 15 outside the region of overlap with the cutouts 17, and is therefore inaccessible and invisible from the outside. In this case, the suspension eyelet 20 is pivoted in the direction of the insert opening 14 by the prestressed torsion spring 34 and supported against a lateral narrow side of the flat key 20 counter to the spring force by a holding pin 37 which protrudes from the fastening ring 31. In this case, the outer periphery of the fastening ring 31 in the region of the holding pin 37 bears linearly against an opposite wall region of the key housing 11.

[0031] The suspension eyelet 30 is therefore held in its non-use position against the force of the prestressed torsion spring 34, by the holding pin 37 and the inserted flat key 20. After the blocking element is unlocked, the flat key 20 can be withdrawn from the receiving shaft 15 of the key housing 11, with the suspension eyelet 30 which is acted on by the torsion spring 34 following the flat key 20 in the withdrawal direction and automatically being pivoted until it reaches its use position.

[0032] Figure 3 illustrates the suspension eyelet 30 in its use position, with the flat key 20 completely withdrawn from the receiving shaft 15. The suspension eyelet 30 is positioned with its fastening ring 31 in the region of overlap with the cutouts 17 in the key housing 20, so that the opening in the fastening ring 31 is accessible from two sides. Thus, a holding element, such as a hook or a keyring, can pass through the opening in the fastening ring for the purpose of suspending the electronic key 10.

[0033] The suspension eyelet 30 has a holding lug 38 which protrudes radially from the outer periphery of its fastening ring 31, and is supported against an opposite bearing face 18 of the key housing 11 in the use position. The torsion spring 34 is not yet fully relieved of stress even in the use position, but instead presses the suspension eyelet 20 against the bearing face 18 of the key housing 11 with a physically prespecified prestress, so that the suspension eyelet 30 is securely fixed in its use position in a play-free manner without rattling.

[0034] When the flat key 20 is reinserted into the receiving shaft 15 of the key housing 11, a lateral narrow side of the shaft section 21 of said flat key runs from a physically prespecified insert depth onto the holding pin 37 of the suspension eyelet 30 and forces the suspension eyelet 30 back into its lowered non-use position as said flat key is inserted further.

[0035] Figures 4 and 5 illustrate an alternative embodiment of an electronic key 110 which differs from the electronic key 10 only in that the key housing 111 includes a suspension eyelet 130 of alternative design. Only a portion of the key housing 111 with a receiving shaft 115 for an associated flat key (not shown) is shown here, it being possible to insert the flat key into the receiving shaft 115 and completely withdraw it from the latter via an insert opening in the upper narrow side of the key housing 111. A suspension eyelet 130 is arranged in the upper end section of the receiving shaft 115 and is integrally formed as a bent sheet-metal part. The suspension eyelet 130 comprises a plate-like fastening ring 131 whose broad sides run parallel to the adjacent broad side of the inserted flat key and which is held at a very small distance from the latter. A bar-like guide leg 132 is bent away from the circular, peripherally closed fastening ring 131 in a perpendicular manner and the suspension eyelet 130 is guided in the receiving shaft 115 in a sliding manner parallel to the insert direction of the flat key by the guide leg.

[0036] In its non-use (stowed) position which is shown in Figure 4, the suspension eyelet 131 is arranged in the receiving shaft 115 outside the region of overlap with the cutouts 117 in the key housing 111, and is therefore inaccessible

and invisible from the outside. The guide leg 132 runs largely parallel to a lateral narrow side of the inserted flat key in the receiving shaft 115 of the key housing 111 and, with one of its broad sides, bears against a wall of the key housing 111 which is laterally adjacent to the receiving shaft 115. The guide leg 132 has a protruding guide lug 137 close to its upper end, which engages with an exact fit into a guide groove (not shown) in the key housing 111 for the purpose of guiding the suspension eyelet 130 in a sliding manner.

[0037] At its free end, the guide leg 132 of the suspension eyelet 130 is spread out in the manner of a fork into two holding arms. A fastening mandrel 139 runs between the latter, with an upper end section of a helical spring 134 being pushed onto the latter. The opposite lower end region of the helical spring 134 is pushed onto a fastening mandrel 119 of the key housing 111, which is situated at a distance opposite the fastening mandrel 139 of the guide leg 132.

[0038] In its non-use (stowed) position, the suspension eyelet 130 is acted on by the prestressed helical spring 134 in the withdrawal direction of the flat key and is supported with the upper narrow side 137 of its guide leg 132 against an edge which projects laterally from the opposite narrow side of the flat key. The suspension eyelet 130 is therefore held down in its lowered position against the spring force of the helical spring 134 by the inserted flat key, with the latter being secured in the receiving shaft 115 of the key housing 111 in a similar manner to the flat key 20 by means of a blocking element (not shown). It is thus possible to completely withdraw the flat key from the receiving shaft 115 of the

key housing 111 through the insert opening after the blocking element is unlocked.

[0039] When the flat key is withdrawn, the suspension eyelet 130 is automatically moved along with the flat key in the withdrawal direction by the prestressed helical spring 134 until said suspension eyelet reaches its raised use position.

[0040] Figure 5 shows that the fastening ring 131 of the suspension eyelet 130 has a holding lug 138 which protrudes radially outward and, in the use position, has run onto an opposite bearing face 118 of the key housing 111. The holding lug 138 is pressed against the bearing face 118 by the helical spring 134, which is not yet fully relieved of stress even in the use position, by a physically prespecified prestress. As a result, the suspension eyelet 130 is fixed in a play-free manner without rattling.

[0041] In the use position, the fastening ring 131 of the suspension eyelet 130 is positioned in the region of overlap with the cutouts 117 in the key housing 111 and is therefore accessible for the purpose of suspending the electronic key 110 with the flat key withdrawn. When the flat key is inserted into the receiving shaft 115, the projecting edge of its narrow side runs onto the upper narrow side of the guide leg 117 of the suspension eyelet 130 and moves the suspension eyelet 130 under the prestress of the helical spring 134 until said suspension eyelet reaches its lowered non-use position.

[0042] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.